

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently amended): A miniature analytical device with thermal regulation comprising:

a cartridge comprising one or more portions constructed of a material, wherein the one or more portions define an array of temperature-controlled zones including reactants, and wherein each said temperature-controlled zones is constrained by cartridge portions that surround an area of space in which a reactant is contained and confine the reactant from flowing into other of said temperature-controlled zones;

an array of heat sources, wherein the array of heat sources is positioned to correspond to the array of temperature-controlled zones so that each heat source is arranged to provide temperature regulation to a corresponding temperature-controlled zone, and wherein one or more of the heat sources emit localized radiation to provide heating in the corresponding temperature-controlled zone;

an optical temperature monitor, not in contact with the cartridge and disposed adjacent to a portion of the cartridge surrounding the temperature controlled zones, that monitors reactant temperature by measuring electromagnetic radiation; and

a modulator that modulates the array of heat sources to regulate temperature in one or more of the corresponding temperature-controlled zones;

whereby each temperature-controlled zone is controllable to a designated temperature.

2. (Previously presented): A miniature analytical device with thermal regulation according to claim 1, wherein:

the array of heat sources comprises electromagnetic radiation emitters.

3. (Previously presented): A miniature analytical device with thermal regulation according to claim 2, wherein:

the electromagnetic radiation emitters comprise vertical cavity surface emitting laser light sources.

4. (Previously presented): A miniature analytical device with thermal regulation according to claim 3, wherein:

the vertical cavity surface emitting laser light sources transmit infrared light through the reactants, thereby facilitating measuring the concentration of a material within the reactants.

5. (Previously presented): A miniature analytical device with thermal regulation according to claim 3, wherein:

the vertical cavity surface emitting laser light sources transmit infrared light through the reactants, thereby facilitating measuring the temperature of the reactants.

6. (Previously presented): A miniature analytical device with thermal regulation according to claim 2, wherein:

the electromagnetic radiation emitters comprise at least one light source chosen from a vertical cavity surface emitting laser light source, a light emitting diode, an infrared lamp, an infrared laser, and an infrared diode laser.

7. (Previously presented): A miniature analytical device with thermal regulation according to claim 6, wherein:

at least one of the electromagnetic radiation emitters in the array of heat sources generates infrared light of a different wavelength.

8. (Previously presented): A miniature analytical device with thermal regulation according to claim 6, wherein:

the at least one light source generates infrared light with a wavelength of at least 0.775 micrometers.

9. (Previously presented): A miniature analytical device with thermal regulation according to claim 6, wherein:

the at least one light source generates infrared light with a wavelength of at most 7000 micrometers.

10. (Previously presented): A miniature analytical device with thermal regulation according to claim 1, wherein:

the array of heat sources comprises internal heat generators.

11. (Previously presented): A miniature analytical device with thermal regulation according to claim 10, wherein:

the internal heat generators comprise at least one electrical heater chosen from resistive heaters, inductive heaters, and Peltier heaters.

12. (Previously presented): A miniature analytical device with thermal regulation according to claim 11, further comprising:

an array of electrical leads positioned to correspond to the internal heat generators.

13. (Previously presented): A miniature analytical device with thermal regulation according to claim 1, wherein:

the array of heat sources comprises external heaters.

14. (Previously presented): A miniature analytical device with thermal regulation according to claim 1, further comprising:

a power supply coupled to the array of heat sources providing sufficient drive current to increase the temperature of the zones.

15. (Previously presented): A miniature analytical device with thermal regulation according to claim 14, further comprising:

a controller coupled to the power supply for controlling the drive current to the array of heat sources.

16. (Previously presented): A miniature analytical device with thermal regulation according to claim 15, wherein:

the controller modulates the power supply based on a temperature measured from the zones.

17. (Previously presented): A miniature analytical device with thermal regulation according to claim 1, further comprising:

an array of temperature monitors, wherein the array of temperature monitors is positioned to correspond to the array of temperature controlled zones.

18. (Previously presented): A miniature analytical device with thermal regulation according to claim 1, wherein:

the reactants comprise assay elements for body fluid analysis.

19.-20. (Canceled)

21. (Withdrawn): A method for providing thermal regulation to a miniature analytical device comprising:

providing a cartridge comprising one or more portions constructed of a material, wherein the one or more portions define an array of temperature-controlled zones including reactants, and wherein each of said temperature-controlled zones is constrained by cartridge portions that surrounding an area of space in which a reactant is contained and confine the reactant from flowing into other of said temperature-controlled zones;

positioning an array of heat sources to correspond to the array of temperature-controlled zones so that each heat source is arranged to provide temperature regulation to a corresponding temperature-controlled zone, and wherein one or more of the heat sources emit localized radiation to provide heating in the corresponding temperature-controlled zone;

monitoring reactant temperature; and

modulating the array of heat sources to regulate temperature in one or more of the

temperature controlled zones;

whereby each temperature-controlled zone is controllable to a designated temperature.

22. (Withdrawn): A method according to claim 21, wherein said localized heat sources transmit infrared light through the reactants, thereby facilitating measuring one or both of concentration or temperature within the temperature-controlled zone.

23. (New): A miniature analytical device with thermal regulation according to claim 1, further comprising:

a feedback loop including use of the reactant temperature to modulate a power supply that drives the array of heat sources.

24. (New): A miniature analytical device with thermal regulation according to claim 23, wherein:

the array of heat source provides a reactant temperature that is one or both of achieved with a smooth control curve or maintained at a desired temperature.